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Didymocyrtis epiphyscia, Lichenochora weillii, and *Lichenoconium xanthoriae* newly recorded from Turkey

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Abstract—Three lichenicolous fungal species, *Didymocyrtis epiphyscia, Lichenochora weillii,* and *Lichenoconium xanthoriae,* are reported for the first time from Turkey. Comments on the taxonomy, ecology, and hosts and photographic illustrations are provided for each species.

Key words—biodiversity, lichens*, Lichenoconiaceae, Phaeosphaeriaceae, Phyllachoraceae*

Introduction

The lichenicolous fungi of Turkey have received increasing attention during the last fifteen years since Hafellner & John (2006) compiled the first checklist recognizing 63 taxa. Halıcı (2008) published an updated list and key for the 117 known taxa of lichenicolous *Ascomycota* (including mitosporic fungi), and subsequent papers have published new records (Halıcı & al. 2012; Kocakaya & al. 2016a, 2018, 2020) and new species (Kocakaya & al. 2016b, Hawksworth & al. 2016).

Among the c. 200 lichenicolous fungi species currently known from Turkey, *Lichenoconium* Petr. & Syd. is represented by six species, *Lichenochora* Hafellner by three species, and *Didymocyrtis* Vain. by one species (John & Türk 2017, Yazıcı & al. 2011). Here, I report the presence of three additional species from those genera and provide interesting information on their anatomy and ecology.

Material & methods

All specimens were collected in Çamlık National Park (Yozgat) during 2018–19. Çamlık National Park is Turkey's first National Park. As a national park, it is a well-preserved area, with oak (*Quercus pubescens*) and hawthorn (*Crataegus orientalis*) woods dominating the lower parts, while the higher elevations are occupied by *Pinus nigra* forests. Lichenicolous fungi are more common in preserved areas.

Vouchers are stored at the lichen herbarium of Yozgat Bozok University, Science and Art Faculty, Yozgat, Turkey, 66400 Yozgat, Turkey (YBUL); herbarium accession numbers are given in parentheses after locality details. Specimens were examined in water, 10% KOH, Lugol's, and Meltzer's iodine solutions. Spores were generally measured in water mounts. The specimens were examined with an Olympus SZX16 stereomicroscope and an Olympus BX53 light microscope. Micro- and macrophotographs were taken with an Olympus DP72 digital microscope camera with c-mount interface and with a 5-megapixel CCD.

New records

Didymocyrtis epiphyscia Ertz & Diederich,
Fungal Diversity 74: 71 (2015) Fig. 1a,b

Conidiomata superficial and aggregated on host apothecia, black, ≤150 µm. Conidiogenous cells ampulliform, aseptate, hyaline, 3–6 µm. Conidiospores simple, hyaline, ellipsoid, with usually one or two small guttules, 4–7 × 3.5–5 µm (n = 50). The lichenicolous fungus host apothecia blacken when infected (Fig. 1a).

Specimen examined—**TURKEY. Yozgat**, **Çamlık National Park**, 39°48′04″N 34°48′49″E, 1615 m, on apothecia of *Physcia stellaris* (L.). Nyl., 20 July 2019, M. Kocakaya MK-4114 (YBUL).

Comments—The Turkish specimen was found growing on the apothecia of *Physcia stellaris* on *Quercus* spp. Ertz & al. (2015) segregated *D. epiphyscia* s.lat. on *Physcia adscendens* and *P. tenella* from genetically related *D. epiphyscia* s.str. on *Physcia aipolia* based on consistently narrower conidia—3.7 –8.0 × 2.0–3.5 µm in *D. epiphyscia* s.lat. and 4.0–7.8 × 3.2–5.0 µm in *D. epiphyscia* s.str. Our specimen completely matches the description of *D. epiphyscia* s.str. (Ertz al. 2015).

Didymocyrtis epiphyscia has also been reported from other host genera, e.g., on *Physconia distorta* (Hawksworth 1981), *Phaeophyscia orbicularis* (Brackel 2011), and *Parmelia sulcata* (Brackel 2007, 2009; Zhurbenko & al. 2012). The species has previously been reported from Austria, France, Scotland, Luxembourg, and Canada (Ertz & al. 2015) as well as *Phoma physciicola* Keissl. from Russia (Zhurbenko & Tugi 2013).

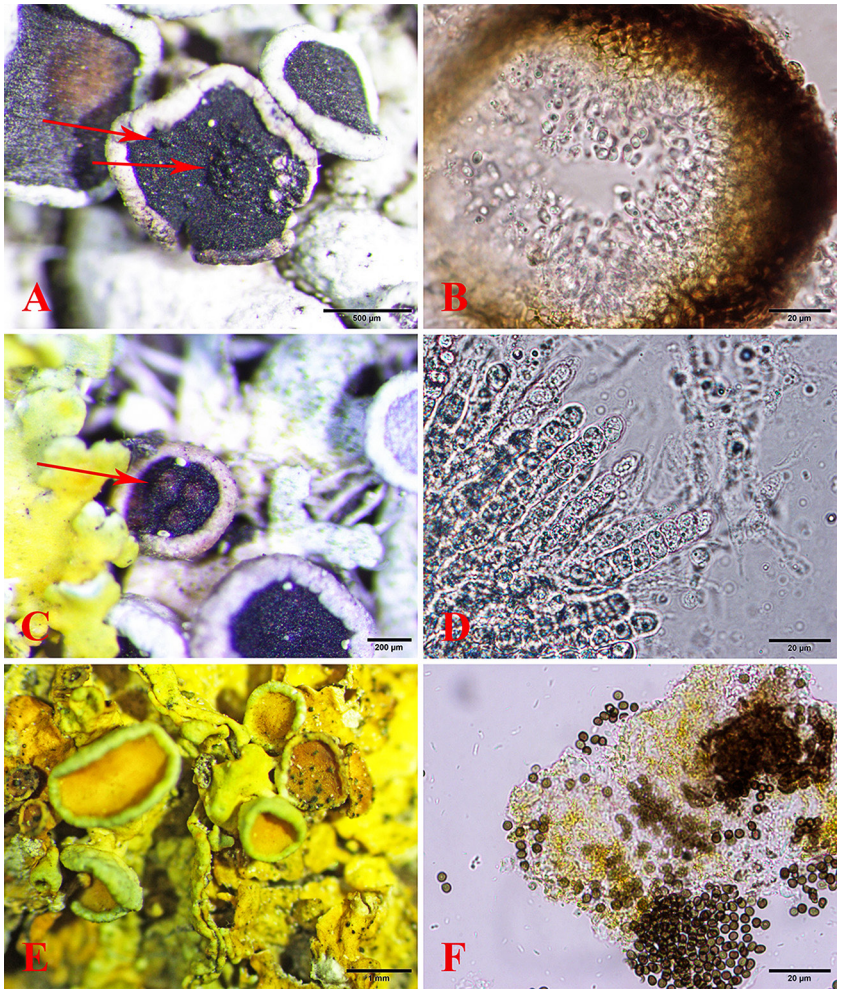

Fig. 1. ***Didymocyrtis epiphyscia*** (MK-4114): A. Perithecia on apothecia of *Physcia stellaris*; B: Conidia. ***Lichenochora weillii*** (MK-3822): C. Perithecia on *Physcia tenella*; D. Ascus and ascospores. ***Lichenoconium xanthoriae*** (MK-3830): E. Conidiomata on apothecia of *Xanthoria parietina*; F. Conidia.

The sole *Didymocyrtis* species previously reported from Turkey represents *D. foliaceiphila* (Diederich & al.) Ertz & Diederich, which differs by its narrowly ellipsoid conidia, immersed pycnidia, and *Cladonia* host (Ertz & al. 2015; Kocakaya & al. 2018).

Lichenochora weillii (Werner) Hafellner & R. Sant.,
Nova Hedwigia 48(3–4): 369 (1989) FIG. 1C,D

Perithecia subglobose to globose, immersed-subimmersed to erumpent in the ostiolar region, 150–200 µm, aggregated in groups. Ascus 8-spored, 70–100 × 10–16 µm (n = 20), with spores are organized in a single row in ascus. Ascospores hyaline, 1-septate, slightly constricted at the septum, smooth-walled, with many guttules in each cell, 9–12 × 7–9 µm (n = 60).

SPECIMENS EXAMINED—**TURKEY. YOZGAT, Çamlık National Park**, 39°48′02″N 34°48′46″E, 1635 m, on apothecia of *Physcia tenella* (Scop.) DC., 22 July 2018, M. Kocakaya MK-3822 (YBUL); 39°48′20″N 34°48′51″E, 1490 m, on apothecia of *Physcia* sp. 22 July 2018, M. Kocakaya MK-3860 (YBUL).

COMMENTS—Our specimens represent the first report of *L. weillii* on *Physcia* hosts. One Turkish specimen was collected from apothecia of *Physcia tenella* on *Acer* spp.; this host is quite common in Turkey (John & Türk 2017). Ascospore sizes vary in the species; they are cited as 7–11 × 5–6 µm by Werner (1937) but as 10–12 × 8–9.5 µm by Hafellner (1989); our specimen matches Hafellner's specimen more closely. Previous studies suggest that *Lichenochora weillii* always develops on *Physconia* spp. (Hafellner 1989; Gromakova 2018; Khodosovtsev & al. 2019), but all the characteristics of our specimens match the original description. *Lichenochora thallina* rarely develops on *Physcia,* but it has longer and narrower ascospores than *L. weillii* (Hafellner 1989). *Lichenochora weillii,* which was originally described by Werner (1937) from Spain, has also been reported from Belgium (Ertz & al. 2008), Svalbard (Zhurbenko & Brackel 2013), Sweden, North America (Hafellner 1989), and Ukraine (Gromakova 2018; Khodosovtsev & al. 2019).

Lichenochora species previously reported from Turkey include *L. aprica*, Hafellner & Nik. Hoffm., *L. atrans* Halıcı & al., and *L. verrucicola* (Wedd.) Nik. Hoffm. & Hafellner (John & Türk 2017, Yazıcı & Aslan 2019).

Lichenoconium xanthoriae M.S. Christ.,
Friesia 5(3–5): 212 (1956) FIG. 1E, F

Pycnidia immersed to erumpent, black, subglobose, (100–)150(–200) µm in diam.; conidiospores dark brown, simple, subglobose, almost smooth to slightly verruculose, 3–6 × 3–5 µm (n = 48). The lichenicolous fungus causes slightly whitening on the host apothecia and thallus (FIG. 1E).

SPECIMEN EXAMINED—**TURKEY. YOZGAT, Çamlık National Park**, 39°48′20″N 34°48′51″E, 1490 m, on apothecia of *Xanthoria parietina*, 22 July 2018, M. Kocakaya MK-3830 (YBUL).

Comments—The Turkish specimen was found growing on the apothecia of *Xanthoria parietina* on *Quercus* spp. The host of the type specimen is *Xanthoria parietina* (Christiansen 1956), but it has also been recorded on other unrelated lichen genera (Brackel 2008; Kocourkova 2000; Triebel & al. 1991). This species was previously reported from Austria (Etayo & Berger 2009), Italy (Brackel 2008), Russia (Himelbrant & al. 2013), and USA (Haldeman 2019).

Lichenoconium species previously reported from Turkey are *L. aeruginosum* Diederich & al., *L. erodens* M.S. Christ. & D. Hawksw., *L. lecanorae* (Jaap) D. Hawksw., *L. lichenicola* (P. Karst.) Petr. & Syd., *L. pyxidatae* (Oudem.) Petr. & Syd., and *L. usneae* (Anzi) D. Hawksw. (John & Türk 2017; Yazıcı & al. 2011).

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